ECS - DAS Interface Confidence Test, ICT5

Overview

This document provides for the testing the interfaces between the ECS and the Data Assimilation System (DAS). These interfaces include the system interface between ECS and the DASCE (Data Assimilation System Computing Environment); and the system interface between ECS and the Data Reduction Platform (DRP) located at the GSFC DAAC and the DAS located at Ames Research Center. The controlling document for this test is "Interface Control Document Between EOSDIS Core System (ECS) and the Data Assimilation System (DAS), 423-41-56, dated June 1997, updated September 1997. This test plan does not include the interface between GSFC DAAC to DASCE (machine to machine), as this interface is not yet defined in this ICD.

Test Objectives:

The objectives of this test are to:

a. Verify that the DAS can acquire input data from ECS via the DAS Data Reduction Platform (DRP). This will be done after the release B.1.

b. Verify that the ECS can ingest DAS data products and metadata.

c. Verify that ECS-DAS interface can handle errors occurred during transmission.

d. Verify ECS users can access DAS data products from ECS DAACs.

ICD Verification versus Test Case

Function	ICD Paragraph Verified	ICD External Interface	From-To	Implementation	Test Case
ECS Detects PDR in PDR server in ARC	Paragraph 4.2.1	Polling	DAS - ECS	FTP. Daemon with operator selected rate	ICT05.01
ECS retrieves PDR from DSA	Paragraph 4.2.2	Product Delivery Record	DAS - ECS	FTP. Message format as defined in Table 4-1.	ICT05.01
ECS receives DMF from DAS	Paragraph 4.2.1	Data and Metadata File(s)	DAS - ECS	FTP get using decoded PDR	ICT05.01
ECS sends PDRD (short and long) to DAS	Paragraph 4.2.3	Product Delivery Record Discrepancy	ECS - DAS	FTP. Message format as defined in Table 4-3.	ICT05.03
ECS sends PAN (short and long) to DAS	Paragraph 4.2.4	Product Acceptance Notification	ECS - DAS	FTP. Message format as defined in Table 4-5 and 4-6	ICT05.02
DAS sends DMF	Paragraph 4.2.5	DAS-ECS	DAS -	Attempt transfer	ICT05.03

Function	ICD Paragraph Verified	ICD External Interface	From-To	Implementation	Test Case
to ECS under error conditions		electronic Data Exchange Error Handling/Back-up	ECS	repeatedly and wait for network connection fix	
Ability to Inventory and order data products	Paragraph 4.2.2	Product Delivery Record	User - ECS	Appendix A.	ICT 5.04

EXHIBIT ICT5-01: DAS Interface Data Flows and Test Case Mapping

Test Configuration:

Hardware and software configuration at each ECS site are managed and operated by M&O organization at that site. The most current configuration status will be obtained prior to start of testing and referenced in the test report.

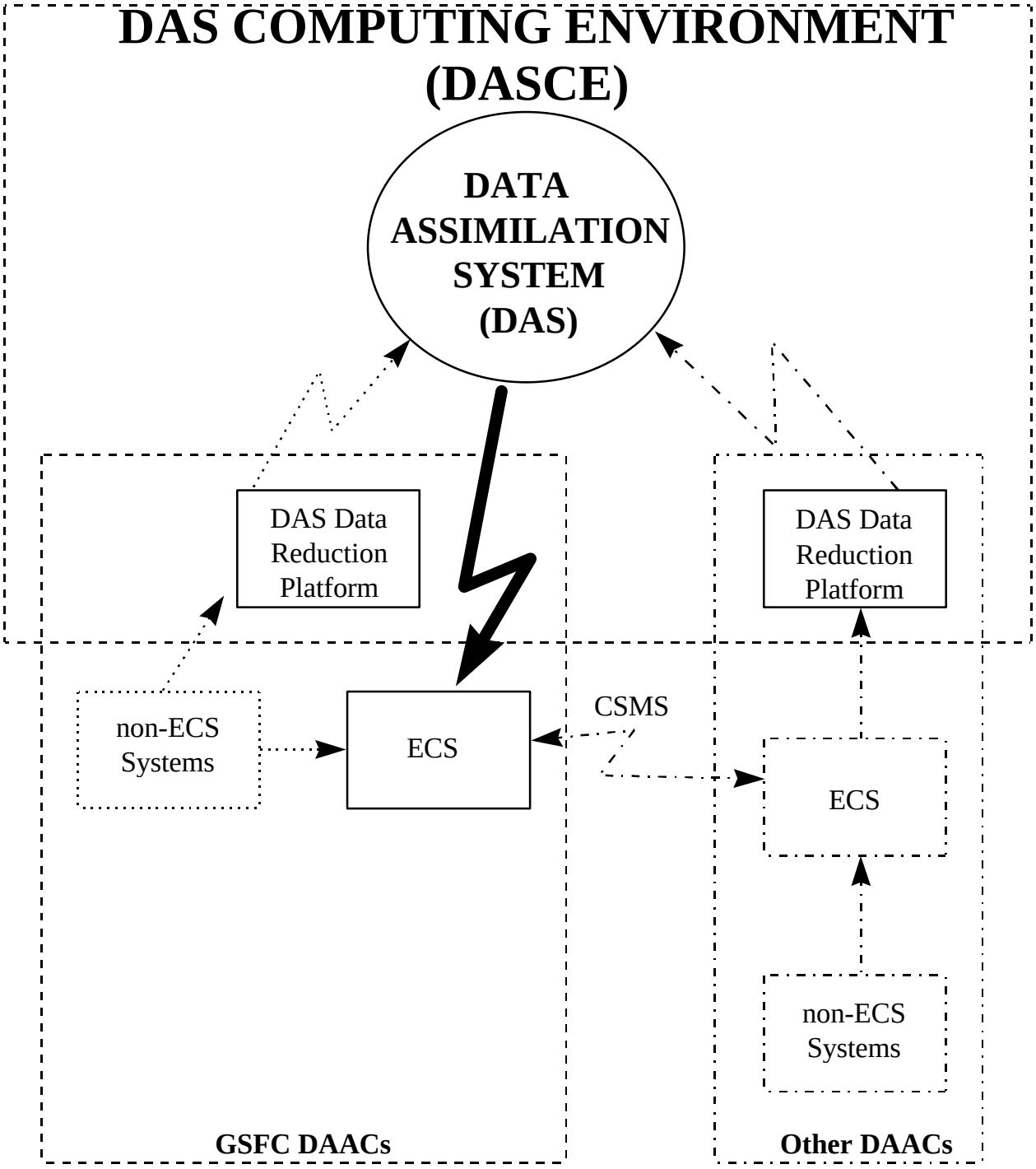


EXHIBIT ICT5-02: Top Level View of ECS/DAS Interface

Participant and Support Requirements:

Participants: ECS Maintenance and Operations (M&O) personnel at GSFC DAAC, DAS Computing Environment (DASCE) M&O personnel at GSFC DAAC, DASCE M&O personnel at Ames Research Center.

EBnet (Network Manager, as needed)

I&T

Communications:

Voice:

GSFC telephone lines as needed

Data:

Asynchronous Transfer Mode (ATM) connection of GSFC to National Research and Education Network (NREN). Connection from GSFC ATM to ECS Ingest Workstation at GSFC DAAC is TBD.

Equipment and Software:

DRP at GSFC DAAC

ECS Ingest Operator Workstation at GSFC DAAC

Ingest GUI

ECS Management Subsystem Server

ECS Ingest Server

Ingest Subsystem

DAS PDR-Server at Ames Research Center

Test Tools:

None.

Test Data:

Description/Characteristics	Source
Product Delivery Record	DAS
Product Delivery Record Discrepancy	ECS/GFSC
DAS Standard Products	DAS
DAS Metadata	DAS
Production Acceptance Notification	ECS/GSFC

Test Case Descriptions:

ICT5.01 Verify ECS at GSFC DAAC can Ingest Data and Metadata files from DAS.

Requirements to be Verified:

DAS0010	DAS0020	DAS0040	DAS1010
DAS2010	DADS0170	DADS1070	DADS1380
EOSD1608	EOSD1990	EOSD2440	EOSD2660
SDPS0020			

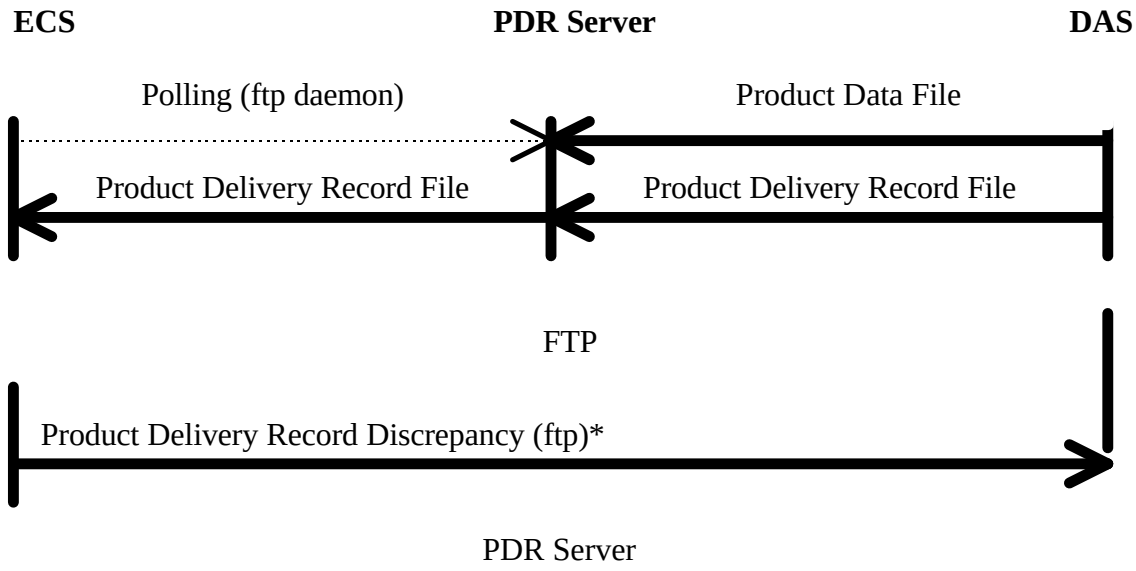
Test Objectives

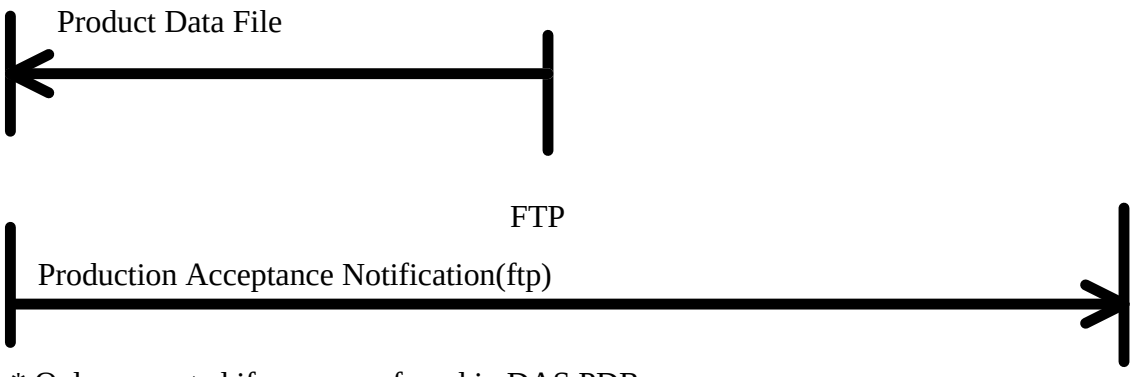
This test verifies that ECS at the GSFC DAAC can detect the availability of and can acquire the DAS data. in the PDR server at Ames Research Center. This detection and retrieval mechanism is described in paragraph 4.2.1 and Figure 4-1 in the ICD.

Test Case Description

This test verifies that ECS is able to poll the DAS and receive data products for ingest and archiving.

The DAS places the Data and Metadata Files (DMF) on the PDR Server in a specified location. With operator tunable periodicity, ECS polls the PDR Server for PDR files. On detection of a PDR, ECS obtains and validates the PDR, and starts data transfer. The data is ingested into ECS in EOS HDF format. A comparison of the ingested data against the original test data verifies data transfer success.





* Only generated if errors are found in DAS PDR

Exhibit ICT5-03: DAS/ECS Data/Metadata File Transfer Mechanism

Prerequisite Conditions:

None.

Test Inputs:

Metadata and science Data Files (MDF), and Product Delivery Record (PDR) in PDR server at Ames

Expected Test Results:

ECS at GSFC DAAC will correctly retrieve PDR and MDF.

Methods for Results Analysis:

Review the history log, the inventory database log and the archive activity log to determine if the files have been correctly identified and retrieved. Verify the filenames along with the time and date and location of the files. Validate the Metadata files against the test data. Validate the structure of the transferred files to determine if the file structure is same as in test data. Verify that a Product Acceptance Notification was sent and that the notification was in agreement with the ICD section 4.2.4.

Test Case Procedures:

Test Case ID	Step Type	Station(s)	Operator Action	Expected Results	Comments
V2-ICT-05.01	TS	ECS	Log in as operator and start ECS-DAS Data Ingest GUI	Entry into ECS-DAS Data Ingest GUI	
	TE	ECS	Launch FTP daemon. Set periodicity to 30 seconds.	FTP daemon accesses designated directory every 30 seconds	
	TS	DAS	Remote Log in at PDR server as operator.	Entry into PDR server workstation.	
	TE	DAS	Place Data/Metadata Files (DMF) in designated directory on the PDR Server (TBD). Execute list directory (ls -l) and date command .	Listing shows data and metadata files with their sizes. Listing shows data transfer begin time	
	TE	DAS	Calculate total data volume by adding file sizes. Note data volume and transfer begin time.		
	TE	DAS	Create a valid PDR and place in its designated directory. Execute list directory command	Listing shows PDR	
	TE	ECS	Use system monitor to observe PDR transfer.	PDR detected and transferred	
	TE	ECS	Use system monitor to observe PDR validation.	PDR is validated successfully.	
	TE	ECS	Use system monitor to observe scheduling of DMF transfer. Observe DMF transfer.	DMF is transferred successfully.	
	TE	ECS	Use system monitor to observe sending of PAN.	DAS receives a PAN whose filename is same as PDR but with an extension .PAN; the message-type is Short pan; disposition is successful; time-stamp is time, ECS receiving last part of data..	
	TE	ECS	Compare DMF to original test data staged in another directory.	Original test data and DMF are identical.	
	TC	ECS, DAS	Execute date command	Listing shows data transfer end time	
	TE	ECS,DAS	From the data volume, and transfer begin and end times, calculate	Data transfer rate will be at least 37.4 GB/day	

Test Case ID	Step Type	Station(s)	Operator Action	Expected Results	Comments
			data transfer rate		
	TC	ECS, DAS	Remove test data from test directories.		
	TC	ECS, DAS	Log out.		

ICT5.02 Verify error handling of unsuccessful DAS data ingest to ECS GSFC DAAC

Requirements to be verified:

DAS0030 DADS1400

Test Objectives

This test verifies that if ECS is unable to receive data products from DAS, it will notify DAS of the error condition. Should there be a problem with network, ECS will make a number of attempts (this number is set by operator) to get the data. If data transfer fails due to network problem, ECS will get the data once the network problem clears.

Test Case Description

This test exercises error handling of unsuccessful poll and ingest of NCEP data.

With operator tunable periodicity, ECS polls the PDR Server for PDR files. On detection and retrieval of a PDR, ECS validates the PDR before it starts data transfer. In case the PDR is invalid , the ECS should automatically return an appropriate PDRD to DAS.(see Test Case ICT5.03). Even after a receiving a valid PDR, the data transfer may fail. Anticipated failure modes are (from Tables 4-5 and 4-6 of ICD):

1. Network Failure
2. Unable to establish FTP/KFTP connection.
3. All file groups/files not found.
4. FTP/KFTP failure.
5. Post-transfer file size check failure.
6. FTP/KFTP command failure.
7. Duplicate file name in granule.
8. Metadata processing error.
9. Resource allocation failure.
10. ECS internal error.
11. Data base access error.
12. Incorrect number of metadata files.
13. Incorrect number of science files.
14. Incorrect number of files.

15. Data conversion failure.

16. Request Canceled.

17. Unknown data type.

18. Invalid or missing file type.

19. File I/O error.

20. Data archive error.

During the test, a selected few of the above errors will be deliberately introduced. A PAN will be sent to DAS from ECS with the appropriate error in the disposition parameter. Finally, a successful transfer is executed to demonstrate that subsequent transfers are not affected by the errors. A comparison of the acquired data against the test data verifies data transfer success.

Prerequisite Conditions:

None

Test Inputs:

MDF and PDR in PDR server at Ames.

Expected Test Results:

ECS at GSFC DAAC will pass through error conditions and will eventually retrieve Data and Metadata files from DAS.

Methods for Results Analysis:

Review the history log, he inventory database log and the archive activity log to determine if the files have been correctly identified and retrieved. Verify the filenames along with the time and date and location of the files. Validate the Metadata files against the test data. Validate the structure of the transferred files to determine if the file structure is in agreement with the ICD. Verify that a Product Acceptance Notification was sent and that the notification was in agreement with the ICD.

Test Case Procedures:

Test Case ID	Step Type	Station(s)	Operator Action	Expected Results	Comments

Test Case ID	Step Type	Station(s)	Operator Action	Expected Results	Comments
V2-ICT-05.02	TS	ECS	Log in as operator and start ECS-DAS Data Ingest GUI	Entry into ECS-DAS Data Ingest GUI	
	TE	ECS	Launch FTP daemon. Set periodicity to 30 seconds. Set number of attempts for data transfer to 5	FTP daemon accesses designated directory every 30 seconds	
	TS	DAS	Remote Log in at PDR server as operator.	Entry into PDR server workstation.	
	TE	DAS	Place Data/Metadata Files (DMF) in designated directory on the PDR Server (TBD). Execute directory listing.	Listing shows DMF.	
	TE	DAS	Create a valid PDR and place in its designated directory. Execute directory listing.	Listing shows PDR.	
	TE	DAS	Locate the network connection cord (UTP, FFDI or coaxial) and prepare to disconnect the cord..		
	TE	ECS	Use system monitor to observe PDR transfer.	PDR detected and transferred	
	TE	ECS	Use system monitor to observe PDR validation.	PDR is validated successfully.	
	TE	ECS	Use system monitor to observe scheduling of DMF transfer. Observe Start of DMF transfer.	ECS will be getting files from DAS.	
	TE	DAS	Disconnect the network connection cord.	ECS will stop getting files from DAS	
	TE	DAS	After 5 minutes reconnect the cord	network connection restored.	
	TE	ECS	Use system monitor to observe resumption of DMF transfer.	ECS will be getting files from DAS.	
	TE	ECS	Compare DMF to original test data staged in another directory.	Original test data and DMF are identical.	
	TE	DAS	Replace Data/Metadata Files (DMF) in designated directory on the PDR Server (TBD). Execute	Listing shows DMF.	

Test Case ID	Step Type	Station(s)	Operator Action	Expected Results	Comments
			directory listing.		
	TE	DAS	Create a valid PDR; in the 1st data group put an invalid data type, in 2nd data group put invalid file type; place PDR in its designated directory. Execute directory listing.	Listing shows PDR.	
	TE	DAS	Delete metadata in 3rd and data in 4th file group.		
	TE	ECS	Use system monitor to observe PDR transfer.	PDR detected and transferred	
	TE	ECS	Use system monitor to observe PDR validation.	PDR is validated successfully.	
	TE	ECS	Use system monitor to observe scheduling of DMF transfer. Observe Start of DMF transfer.	ECS will be getting files from DAS.	
	TE	ECS	Use system monitor to observe sending of PAN.	DAS receives a long PAN whose filename is same as PDR but with an extension .PAN; the message type, disposition, and time stamp matches the error introduced.	
	TE	ECS	Compare DMF to original test data staged in another directory.	Original test data and DMF are identical for the files transferred.	
	TC	ECS, DAS	Remove test data from test directories.		
	TC	ECS, DAS	Log out.		

ICT5.03 Verify error handling of invalid Delivery Records

Requirements to be verified

DAS0030 DADS1400

Test Objectives

This test verifies that ECS is able to recognize an invalid PDR received from DAS and is able to notify DAS about the invalidity by sending a PDRD to DAS.

Test Case Description

This test verifies that ECS can send a PDRD to DAS when necessary.

With operator tunable periodicity, ECS polls the PDR Server for PDRs. On detection of a PDR, ECS attempts to validate the PDR. If ECS finds an error in the PDR, it automatically sends a PDR Discrepancy (PDRD) via FTP to DAS with the detected errors. The filename of the PDRD is same as PDR but has an extension of .PDRD. Two types of PDR, short and long, will be sent depending on two kinds of errors introduced in the PDR:

a. Short PDRD: Entire PDR is invalid due to an invalid header parameter. In this case a short PDRD will be sent by the ECS. The errors that will cause a short PDRD to be sent are listed below (from ICD Table 4-3). In the PDRD, the message type will be "SHORTPDRD", and the disposition will be one of these errors. The accounted for errors are:

    1. Invalid file count.
    2. ECS internal error.
    3. database failures.
    4. invalid PVL statement.
    5. Missing or invalid originating-system parameter.
    6. Data provider request threshold exceeded.
    7. Data provider volume threshold exceeded.
    8. System request threshold exceeded.
    9. System volume threshold exceeded.

b. Long PDRD: A PDR with multiple file groups has one or more invalid groups. In this case a long PDRD will be sent by the ECS. The errors that will cause a long PDRD to be sent are listed below (from ICD Table 4-4). In the PDRD, the message type will be "SHORTPDRD", and the disposition for the erroneous data-type will be one of these errors. The disposition for error-free data-type will be "SUCCESSFUL". The accounted for errors are:

    1. Invalid data type.

2. Invalid directory.
3. Invalid file size.
4. Invalid file ID.
5. Invalid Node name.
6. Invalid file type.

When ECS sends a PDRD to DAS, it will not schedule any data retrieval from DAS and no data file is sent from DAS. DAS will correct the error in PDR and submit the entire PDR to ECS again for validation. After all errors listed above are tested, a successful transfer will be executed to demonstrate that subsequent successful transfers are not affected by the errors. A comparison of the accessed data against the test data will verify data transfer success.

Prerequisite Conditions:

TBD

Test Inputs:

MDF and PDR in PDR server at Ames

Expected Test Results:

ECS at GSFC DAAC will correctly analyze a PDR received. ECS will recognize an invalid PDR and send a PDRD to DAS.

Methods for Results Analysis:

Review the PDRD and validate it by comparing its format and content with Tables 4-3 and 4-4.

Test Case Procedures:

Test Case ID	Step Type	Station(s)	Operator Action	Expected Results	Comments
V2-ICT-05.03	TS	ECS	Log in as operator and start ECS-DAS Data Ingest GUI	Entry into ECS-DAS Data Ingest GUI	

Test Case ID	Step Type	Station(s)	Operator Action	Expected Results	Comments
	TE	ECS	Launch FTP daemon. Set periodicity to 30 seconds.	FTP daemon accesses designated directory every 30 seconds	
	TS	DAS	Remote Log in at PDR server as operator.	Entry into PDR server workstation.	
	TE	DAS	Place Data/Metadata Files (DMF) in designated directory on the PDR Server (TBD). Execute directory listing.	Listing shows DMF.	
	TE	DAS	Create a PDR in the designated directory. Execute directory listing.	Listing shows PDR.	
	TE	DAS	Modify PDR to put following error: 'invalid file count'. List the PDR file	Listing will show the PDR error.	
	TE	ECS	Use system monitor to observe PDR transfer.	PDR detected and transferred	
	TE	ECS	Use system monitor to observe PDR validation.	PDR could not be validated.	
	TE	ECS/DAS	Use system monitor to observe sending of a PDRD to DAS.	DAS receives a PDRD whose filename is same as PDR but with an extension .PDRD; the message-type, and disposition matches the error inserted in PDR; DAS generates a valid PDR.	
	TE	ECSDAS	Repeat last four steps for following errors: Invalid PVL statement(short PDRD), Invalid directory (long PDRD), and Invalid file ID(long PDRD)	DAS receives a PDRD, the message-type, data-type (for long PDRD) and disposition matches the error inserted in PDR. DAS generates a valid PDR	
	TE	DAS	Leave valid PDR intact.		
	TE	ECS	Use system monitor to observe PDR transfer. and validation	PDR transferred and validated.	
	TE	ECS	Use system monitor to observe scheduling of DMF transfer. Observe DMF transfer.	DMF is transferred successfully.	
	TE	ECS	Use system monitor to	DAS receives a PAN	

Test Case ID	Step Type	Station(s)	Operator Action	Expected Results	Comments
			observe sending of PAN.	whose filename is same as PDR but with an extension .PAN; the message-type is Short pan; disposition is successful; time-stamp. is time ECS receiving last part of data.	
	TE	ECS	Compare DMF to original test data staged in another directory.	Original test data and DMF are identical.	
	TC	ECS, DAS	Remove test data from test directories.		
	TC	ECS, DAS	Log out.		

ICT5.04 Verify ECS users can access DAS data products from ECS DAACs.

Requirements to be verified

TBS

Test Objectives

This test verifies that ECS users can query the ECS archived DAS standard product data by specific search criteria, view metadata representing query results, and order products for distribution electronically or on physical media.

Test Case Description

This test verifies that ECS ingested DAS standard product data is available for use inventory and product order purposes.

ECS ingested DAS standard product data consist of the following groups:

1. First Look Analysis Major Product Groups.
2. Final platform Analysis Major Product Groups.
3. Pocket Analysis Major Product Groups.
4. Long Term Re-Analysis Major Product Groups.
5. Off-Line Re-Analysis Major Product Groups

Appendix A. Tables A-1 through A-5 provides a description of the product groups and the rate of output data to be passed from DASCE to ECS at the GSFC DAAC, that are available for order.

Prerequisite Conditions:

TBD

Test Inputs:

Source/Platforms, Sensors, Geophysical Parameters, Processing Level, Dataset Name, Data Center ID, Date/Time, Campaign/Project, Day/Night Flag, and Temporal Intervals.

Expected Test Results:

ECS at GSFC DAAC will correctly provide a description of granules from the inventory that satisfies the specified search criteria.

ECS will provide/display information pertaining to orderable data products.

Methods for Results Analysis:

Verify the granule descriptions provided against the specified search.

After successfully completing an order, verify that the contact information, for the requested products data center exist.

Test Case Procedures:

Test Case ID	From	To	Operator Action	Description	Expected Results
1	ECS (User)	ECS	User submits an inventory search query	Using normal user operational interfaces (Search and Order Tool)	ECS replies with inventory query results
2	ECS (User)	ECS	User submits an order for an available product	Product list provided as a result of the previous inventory search	ECS provides order confirmation message

Appendix: Test Package Requirements Summary

Requirement	Description	Test Case(s)
DAS0010	DASCE shall have the capability to provide, and the ECS at GSFC DAAC shall have the capability to receive, notification of data availability using an agreed protocol.	5.01
DAS0020	ECS at GSFC DAAC shall have the capability to provide, and DASCE at NASA Ames Research Center shall have the capability to receive, acknowledgments of receipt of file transfers using an agreed protocol.	5.01
DAS0030	ECS at GSFC DAAC shall have the capability to provide, and DASCE shall have the capability to receive acknowledgments, of errors during file transfers using an agreed protocol.	5.02, 5.03
DAS0040	DASCE shall have the capability to provide, and ECS at GSFC DAAC shall have the capability to acquire, archive and distribute, DAS Standard Product data, and associated metadata in HDF-EOS standard format.	5.01
DAS1010	DASCE shall have the capability to interface with ECS at the GSFC DAAC using an agreed upon authorization and authentication protocol.	5.01
DAS1020	ECS at the GSFC DAAC shall have the capability to interface with DASCE using an agreed upon authorization and authentication protocol.	5.01
DAS2010	The ECS within the GSFC DAAC shall have the capacity to support the data volumes and rates as defined in Appendix A and B of the IRD Between EOSDIS ECS and the DAS for the ECS Project.	5.01
DADS0170	Each DADS shall be capable of receiving from designated EPDSs and ODCs, at a minimum, the following: a. L0-L4 data sets b. Metadata c. Ancillary data d. Calibration data e. Correlative data f. Documents g. Algorithms	5.01
DADS1070	The DADS shall send data check and storage status to the provider of ingest data.	5.01
DADS1380	Each DADS shall monitor data transfer between	5.01

	external (non-ECS) elements and the DADS.	
DADS1400	Each DADS shall notify the originating source of the need to retransmit data in the event of transmission difficulties.	5.02, 5.03
EOSD1608	ECS elements shall receive from EPDSs the following at a minimum: a. Data products b. Ancillary data c. Calibration data d. Correlative data e. Metadata f. Data information g. Documentation	5.01
EOSD1990	The ECS system and elements shall employ security measures and techniques for all applicable security disciplines which are identified in the preceding documents. These documents shall provide the basis for the ECS security policy.	5.01
EOSD2440	Data base integrity including prevention of data loss and corruption shall be maintained.	5.01
EOSD2660	ECS elements shall at all times maintain and comply with the security directives issued by the SMC.	5.01
SDPS0020	The SDPS shall receive EOS science, engineering, ancillary, and expedited data from the EDOS, the SDPF, and the IPs, and non-EOS data, in situ data, associated algorithms, documentation, correlative data, and ancillary data (as listed in Appendix C) from ADCs, EPDSs, and ODCs.	5.01